Blockchain Standards in International Banking: Understanding Standards Deviation

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Abstract

This article discusses how blockchain standards need to be integrated into the other standards of international banking to facilitate the effective use of the technology. The first part of the article describes the role that blockchain could perform in international banking and why standards are needed for this. The second part of the article describes the role that standards of many different types perform in international banking. The third part of the article describes areas of potential deviation between standards developed for the implementation of blockchain technology and the existing standards which apply to international finance and why these conflicts cannot be ignored.

Keywords: Standards, Blockchain, Smart Contracts, International Banking, Derivatives.

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List of Notations, Abbreviations and Definitions

FSB	The Financial Stability Board, and international body comprised of governments, central banks and regulators which promotes global financial stability by coordinating the development of regulatory, supervisory and other financial sector policies.
G20	The international forum for global economic cooperation comprised of finance ministers and central bank governors of 19 economically significant countries and the European Union. G20 members account for 86 per cent of the world economy, 78 per cent of global trade, and two-thirds of the world's population.
ISDA	International Swaps and Derivatives Association, Inc., an international trade association for participants in the global derivatives market.
ISO	International Organisation for Standardization.
OTC derivatives	Over-the-counter derivatives, meaning derivatives that are not entered into on an exchange. The global OTC derivatives market is significantly larger than the exchange-traded derivatives market. For convenience, all reference to derivatives in this article are references to OTC derivatives.
SWIFT	the Society for Worldwide Interbank Financial Telecommunication.

1 Blockchain in International Finance

The emergence of blockchain technology has seen a rapid growth of interest in the financial sector, with particular attention being paid to its application to international financial markets. Examples of these potential use cases are discussed in this section.

1.1 Payment, Clearing and Settlement

Much of the initial focus of blockchain technology in international finance has been in payments, clearing and settlement. One reason for this is the

technology's ability to host self-executing smart contracts. The combination of blockchain technology and smart contracts allow for the creation of a "shared machine" which allows market participants to carry out transactions without needing a central authority to facilitate the transactions and maintain a single ledger that records the transactional truth.[1] This introduces various benefits, such as:

- reduced complexity;
- improved availability of assets and funds through improved end-to-end processing speed;[2]
- increased transparency and immutability of transaction record keeping;
- improved network resilience through distributed data management; and
- reduced operational and financial risk.[3]

More complex settlements such as OTC derivatives could, to some extent, be automated by smart contracts, where information exchange and cash flow could be coded into a smart contract to reduce settlement and operational risk.[4] Financial products such as short term debt,[5] securities[6] and repurchase agreements[7] could also be performed by smart contracts.

1.2 Central Bank Digital Currencies

A further use of blockchain technology in international finance markets is in digital currencies and, in particular, sovereign digital currencies. Blockchain technology could facilitate widely-distributed electronic central bank money.[8]

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[1] *Committee on Payments and Market Infrastructures*, "Distributed ledger technology in payment, clearing and settlements: An analytical framework", February 2017, 2 https://www.bis.org/cpmi/publ/d157.pdf.

[2] *BIS*, "BIS Quarterly Review", September 2017, 55 https://www.bis.org/publ/qtrpdf/r_qt1709f.pdf.

[3] *Committee on Payments and Market Infrastructures*, "Distributed ledger technology in payment, clearing and settlements: An analytical framework", February 2017, 1 https://www.bis.org/cpmi/publ/d157.pdf.

[4] *IOSCO*, "IOSCO Research Report on Financial Technologies (Fintech)", February 2017, 55 https://www.iosco.org/library/pubdocs/pdf/IOSCOPD554.pdf.

[5] Ibid 56.

[6] *BIS*, "BIS Quarterly Review", September 2017, 67 https://www.bis.org/publ/qtrpdf/r_qt1709f.pdf.

[7] *IOSCO*, "IOSCO Research Report on Financial Technologies (Fintech)", February 2017, 56 https://www.iosco.org/library/pubdocs/pdf/IOSCOPD554.pdf.

[8] *BIS*, "BIS Quarterly Review", September 2017, 56 https://www.bis.org/publ/qtrpdf/r_qt1709f.pdf.

Such central bank digital currencies would allow market participants to settle payment obligations which arise through a blockchain-based transaction system without the need to connect to a separate system. Further, such central bank digital currencies could also act as a digital form of cash for retail customers too.

1.3 Loan Syndication

Another example use case for blockchain in international finance is in syndication of loans (the distribution of lending rights and obligations between lenders). Loan syndications involve significant amounts of manual processes, and there exists no unified platform to record and communicate information as a loan syndication is occurring. Blockchain platforms could be developed to unify and record these processes and facilitate loans.[9]

1.4 Customer Identification

Blockchain technology can be used to streamline financial institution Know Your Customer ("KYC") and Anti Money Laundering ("AML") processes. For example, by:

- sharing client information among financial institutions;
- codifying client accounts to enhance transaction surveillance transparency; and
- unifying transactions to a single ledger to streamline the auditing process.

Further, this use case could be developed further into the creation of digital identification frameworks, where an information relating to the identification of an individual or legal entity could be recorded on a blockchain. Such a system could provide many benefits, such as financial inclusion, and improved KYC and AML compliance.

1.5 Role of Blockchain Standards in International Finance

The above blockchain use cases in international finance require the co-operation of global market participants, even though they operate in different countries and under different regulatory regimes. Such co-operation requires that there be consistency in dealing with issues such as security, privacy,

[9] *IOSCO*, "IOSCO Research Report on Financial Technologies (Fintech)", February 2017, 55 https://www.iosco.org/library/pubdocs/pdf/IOSCOPD554.pdf.

identity, governance, use cases, smart contracts and interoperability. Consistency is a core function of standards and blockchain standards could provide this consistency for the technology's use in international finance.

However, there are already many other standards which apply in international finance.

2 Standards of International Finance

International financial markets are both complicated and complex. The products and services, such as those involved in cross-border financing and international derivative markets are extremely complicated, as are many of the entities that acquire and provide them. The sums of money involved, and the velocity of transactions entered into, are extremely significant. Further, the complexity produced by the interconnectivity between these products, services and entities is difficult for even experienced experts to comprehend. This complexity produces an astonishing set of possible variations. Accordingly, it is not surprising that there are a number of different types of standards which together form the framework on which these markets function.

2.1 Technological Standards

The standards which are most obvious are the technological standards. Participants in the international financial system invest immense amounts in technology and achieving connectivity and consistency between them depends on standards being adopted. A good example is the standard used for messages. These standards are used for payment services, clearing systems and settlement systems. In Australia, the migration of the standards currently used for these systems (the SWIFT Message Type messaging standards) to the ISO 20022 standard is currently being considered.[10] The intention of this migration is to allow participants to use the same standard for all payment flows. The Reserve Bank of Australia's Payment Systems Board has identified migration to the ISO 20022 standard as a key strategic issue for the Australian Payment System.[11] That the transition to a new technological standard requires the attention of a central bank demonstrates the importance that technological standards have in international finance.

[10] *Reserve Bank of Australia*, "ISO 20022 Migration for the Australian Payments System – Issues Paper", April 2019.

[11] Ibid 1.

However, technological standards are not the only standards on which international finance relies. Others which are just as critical are commercial standards, regulatory standards and legal standards. These are described below. For context, reference is made to the example of the global derivatives market, which is an important component of international finance.

2.2 Commercial Standards

The global derivatives market is large. According to the Bank of International Settlements, the notional value of outstanding derivatives at the end of June 2018 was US$595 trillion.[12] However, there is a difference between the notional amount of derivatives and the market exposure created by them, and the gross market value of these OTC derivatives at this time was considerably less, nearing US$11 trillion.[13] Due to the offsetting arrangements between parties, the actual credit exposure created by these contracts was less, at US$2.6 trillion. Nevertheless, even at US$2.6 trillion, the global derivatives market is an enormously significant part of global banking and the global economy.

Most of the derivatives transactions relate to interest rates, foreign exchange or credit risk (in that order of size). These are bilateral transactions between parties where payments and deliveries may vary by reference to underlying interest rates, exchange rates or risk of default. The purpose of these arrangements is to manage risk and return, including to hedge other risks (such as under a borrowing of money) or to speculate (for example by taking a view on future movement in exchange rates).

Often, the risks which are to be managed by the use of derivatives are ones which have arisen under other derivatives. For example, an interest rate swap may manage the risk of an interest rate payable under a currency swap.[14]

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[12] *Bank for International Settlements*, "Statistical release: OTC derivatives statistics at end-June 2018", 31 October 2018.

[13] The notional amount is the figure from which parties' payments are calculated, whilst the gross market value is the value of those payments, at current market prices. By way of explanation, if the payments of interest under a loan were to be expressed as a derivative, then the amount of the loan on which the interest is calculated would be the notional amount and the gross market value would be the total amount of interest payable, valued as if it were payable at once.

[14] An interest rate swap is a derivative transaction under which the two parties agree to exchange payments based on the application of different interest rates on the same notional amount. Under a cross-currency swap the notional amount for each party is denominated in a different currency, and the notional amounts are also exchanged at the start and end of the transaction.

For this reason, standardisation of the commercial terms of derivatives contracts is critical, so that transactions can have matching terms when needed, even when entered into between different parties in different parts of the world. This has primarily occurred through the production of standard terms and documents by the International Swaps and Derivatives Association, Inc. (ISDA) during the thirty or so years of development of the global derivatives market. These commercial standards set the consistent basis on which derivatives can be traded globally, from the more common derivatives such as interest rate and currency forwards, swaps and options, to ones which are less common, such as those based on carbon intensity and weather events. Without these commercial standards, the global derivatives market could not function with anything like the efficiency it currently has for managing risks. For this reason, derivatives which do not meet these commercial standards are not able to be transacted on any significant scale.

Similar standards do exist in other parts of international finance. The most widely adopted commercial standards are the benchmark interest rates used not only for derivatives but also for other types of international finance such as debt finance, syndicated finance and leasing. These benchmark interest rates (such as LIBOR, which is used in the United States and Europe as well as elsewhere) form the common commercial standard on which interest rates are based. The magnitude of the current efforts to transition the global finance markets from some of these benchmark rates to others which are more robust shows not only the importance of them as standards, but also the care that is required in setting them.[15]

2.3 Regulatory Standards

Regulation itself can be considered a standard. However, the concept of regulatory standards is more extensive than this. The international derivatives market is important not only because of its size, but because of the interconnectedness which it creates between banks and other important institutions across many countries. In the words of the FSB:

> "*In the lead up to the global financial crisis large volumes of outstanding bilateral transactions had created a complex*

[15] *Financial Stability Board*, "Reforming major interest rate benchmarks: Progress Report", 14 November 2018.

> *and deeply interdependent network of exposures that ultimately contributed to a build-up of systemic risk*."[16]

As a consequence, making the derivatives markets safer was one of the four core elements of the reform programme implemented by the G20 group of nations following the global financial crisis of 2007–2009.[17] This coordinated regulatory approach was aimed at improving transparency, mitigating systemic risk, and protecting against market abuse. The reforms required the reporting of OTC derivatives to trade repositories, the clearing of standardised contracts through central counterparties, the use of exchanges or electronic trading platforms and the introduction of capital and margin requirements. The implementation of these reforms was coordinated across the G20 nations, and the progress was overseen by the FSB.[18] This work of the G20 nations represents one of the largest cross-border efforts to coordinate international regulation of finance through the articulation of standards to be met by each country's regulation.

Other parts of international finance also have internationally agreed regulatory standards, such as those set by the Bank for International Settlements in relation to bank capital.[19]

These international regulatory standards demonstrate that the relationship between standards and regulation is deeper than standards being incorporated into regulation in individual countries, and broader than regulation being a form of standard to which market participants must adhere. Beyond each of these there is a global framework of regulatory requirements, based on internationally agreed standards which need to be implemented.

Without these common standards in regulation, the efficiency of international finance would be severely curtailed as different jurisdictions pursued different regulatory approaches with multinational institutions active in an international marketplace.

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[16] *Financial Stability Board*, "Making Derivatives Safer" https://www.fsb.org/work-of-the-fsb/policy-development/making-derivatives-markets-safer/.

[17] The others were making financial institutions more resilient, ending too-big-to-fail and enhancing the resilience of "shadow banking".

[18] *Financial Stability Board*, "Implementation and Effects of the G20 Financial Regulatory Reforms: 28 November 2018 4th Annual Report", November 2018 https://www.fsb.org/wp-content/uploads/P281118-1.pdf.

[19] *Bank for International Settlements*, "Minimum capital requirement for market risk", January 2019 https://www.bis.org/bcbs/publ/d457.pdf.

2.4 Legal Standards

In addition to regulatory standards, international finance is also subject to legal standards. These apply separately from the regulation of the products, services and entities involved. Like regulation, the law of any jurisdiction can be viewed as a set of standards to which persons, and "legal persons" (such as companies) must adhere to. One example of this is the legal requirements for the contracts on which financial services are based to be binding, and the interests in property which are conveyed under them to be effective. Non-compliance with these standards renders the transactions which form the basis of international finance ineffective at law and can, as a result, cause them to have no effect.

However, just as with regulatory standards, the concept of legal standards goes further than individual laws representing a standard of conduct. Often there needs to be a high level of commonality between these requirements under the laws of different countries in order for cross-border finance to function. In some cases, this commonality arises because of shared history, or shared objectives, of the legal systems of different jurisdictions rather than cross-border standardisation. An example of this is the requirement in many countries of both legal capacity and consideration to create binding contracts. However, in other cases, legal standards can develop directly in response to the requirements of international finance for that commonality. An example of this is the adoption of model netting laws designed to ensure that contractual netting arrangements are effective despite insolvency.[20] Another, is the international convention on the laws needed to ensure that security taken over dematerialised assets is enforceable.[21]

These international standards of law enable cross-border finance to be both effective and efficient. Without these international legal standards, participants in international finance would need to adopt completely different legal approaches in different countries. For this reason, participants in international financial markets ensure that their operations are consistent with legal standards.

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[20] *International Swaps and Derivatives Association, Inc.*, "Model Netting Act and Guide", 2018.

[21] The Convention on the law applicable to certain rights in respect of securities held with an intermediary, or Hague Securities Convention.

2.5 Standards in International Finance

The brief discussion above shows how there is a combination of commercial, regulatory and legal standards in the global derivatives market, which is just a sample of, and not unique in, international finance. Although the cross-border extent of their adherence can differ, similar sets of international standards function in syndicated financing, trade finance, and debt capital markets. In all cases, it is necessary to understand the critical function of these standards in seeking to implement any new technology (including blockchain), and its associated standards, in those markets. Deviation between blockchain standards and the standards which apply in international finance will hinder the adoption of the technology.

3 Standards Deviation in International Finance

Conflict between applicable standards already occurs in international finance. For example, following the global financial crisis, some initial regulatory requirements of the United States and the European Union were not consistent, with the result that multinational banks could not comply with both sets of requirements simultaneously. Commercial standards can also conflict with legal standards, for example, where there is a commercial understanding that outstanding arrangements can be terminated when a bank defaults. In this case, this understanding is sought to be acted on in circumstances where that bank is being managed through its insolvency for the benefit of its depositors. Participants in international finance invest significant resources to manage these conflicts in order for markets to function.

Technological standards developed for the use of blockchain technology are not immune from this conflict when blockchain is used in international finance. Initially, these can be expected around key features of blockchain technology which are different to the commercial, regulatory or legal requirements of the international financial markets. This includes immutability, distribution, visibility, execution and automation. Each of these is addressed below in turn.

3.1 Immutability

A fundamental feature of a "pure" blockchain system is that it is immutable, meaning that transactions recorded on the distributed ledger are unable to be changed or reversed, without the co-operation of a certain proportion of the nodes operating the system. This is a critical foundation of the trust which is

established by the blockchain, as it means that transactions which have been validated and recorded cannot be changed.

However, the legal standards which operate in international finance markets rarely treat transactions as immutable. There are many example of laws which require the rectification of events which have occurred which are deemed not to be honest, reasonable, fair or in good conscience. One example are laws which render obligations under a contract to be void or voidable. This can happen because of the insolvency or bankruptcy of one of the parties, the contract is found to be unauthorized, improper or fraudulent or the purpose of the contract, or the conduct of the parties is contrary to regulation or otherwise unlawful. These laws are a particular focus in international finance as they can result in significant losses being incurred.

3.2 Distribution

Linked to the concept of immutability is that of distribution. This is the concept that the robustness and resilience of the record maintained on a blockchain is supported by the distribution of the entities which validate and record each transaction, using whatever consensus mechanism is applicable to the blockchain. These entities which perform this function may be located anywhere in the world, and may have unknown identities.

This aspect of blockchain can present significant difficulties for the use of blockchain in financial markets. This is because it can conflict with both regulatory and legal standards. Regulatory standards may require that the regulators of a particular jurisdiction are entitled to require remediation action to take place because of harm caused by particular transactions. However, this will be difficult to effect if it requires the cooperation of entities located beyond the jurisdiction of a regulator, court or government. Further, legal standards may stipulate that the relevant law for determining an important legal issue, such as the location of rights under a financial product, is located in the place where the record of ownership of that product is maintained. If that record is maintained in a number of different countries simultaneously by independent entities, then those legal standards are not able be adhered to.

3.3 Visibility

A further related feature of blockchain applications is visibility. This includes the visibility of transactions which are recorded, and the parties that transacted them.

It would be common for the transactions recorded on a blockchain to be visible. The idea that all transactions are recorded on a distributed ledger which is visible to anyone might seem to have beneficial application in international finance, given the misconduct identified by regulators leading up to the global financial crisis. However, it is important to note that absolute transparency conflicts with standards which are important to the proper functioning of international finance markets. For example, transactions in international finance can be confidential without being improper or illegal. As a commercial matter, many entities that use international finance markets, such as manufacturers of goods, would not want the terms of their financing available to their competitors. Indeed, this is one reason why banks are bound to keep their clients' affairs secret, unless otherwise required by law. Blockchain standards which are to be applied in international finance will need to address these requirements or be in conflict with commercial or legal standards.

In contrast to the visibility of transactions, it would be common for the transacting parties to not be visible on a blockchain in the same way. Instead, the transacting parties are more likely to be pseudo-anonymous, so that they are only identified by a number or code. This also conflicts with standards in international finance. It is not possible to lawfully conduct transactions in international finance without conducting lengthy and thorough checks on counterparties, to verify the identity of all those involved. This has been driven by a combination of regulatory standards, such as those relating to financial crime, money-laundering and terrorist financing.[22]

3.4 Automation

Blockchain technology can achieve efficiency, timing and performance improvements through smart contracts that automate the performance of agreed processes. These smart contracts are coded processes that are stored, and which can be effected, on a blockchain.

However, the terms of contracts in international finance are complicated, because of the commercial, legal and regulatory standards which apply. Some involve more than expressions of logic, and instead involve expressions of discretion, reason and conscience. Accordingly, not all of the contractual provisions in international finance are able to be represented as a coded

[22] *Financial Action Task Force*, "Public Statement – Mitigating Risks from Virtual Assets", 22 February 2019, http://www.fatf-gafi.org/publications/fatfrecommendations/documents/regulation-virtual-assets-interpretive-note.html

process. For example, a clause in a derivatives contract which requires that, if an event happens "the price is to be adjusted by subtracting the product of x and y" should be able to be faithfully represented in code without losing meaning. However, if the clause requires that if the event happened then "the price is to be adjusted by the party in a commercially reasonable manner" or "the price is to be adjusted by negotiation between the parties in good faith" then any representation in code is going to be an incomplete representation of the commercial agreement between the parties because these provisions are expressions of reason and conscience and not logic.

Another example of conflict between technological standards in blockchain with standards used in international finance is in connection with the use of discretion. For example, it is very unusual for contracts in international finance to include automatic responses to unexpected events, such as the failure of a party to perform its obligations. This is because the consequences of exercising the contractual rights available in these circumstances can be extreme given the amounts of money involved and the interconnectedness of the participants and the markets. For example, if a large financial institution fails to perform its obligations under a derivatives contract, although parties have a right to terminate the transactions, they will often wait so that they can understand the broader context. This is not just a question of whether the default was merely an operational error, but also whether there is a regulatory reason or the impact which it has on other financing relationships. Contractual provisions which automatically take action when default occurs are not used because they cause the parties to lose control. Similarly, automation of such actions on a blockchain would also cause the parties to lose control.

3.5 Execution

An element of the trust placed in blockchain systems is derived from the manner in which they enable tamper-proof execution. This means that processes can be completed without requiring the input of external entities. The effect of self-executing performance of smart contracts has been described as "the code is law", because the coded provisions have effect without external input or control.[23]

However, regulatory and legal standards applicable in international finance can terminate or interrupt the performance of contracts, or cause the reversal

[23] Indeed, that is the very expression used by some leading commentators, such as Lawrence Lessig. Lessig's original work was in fact called *The Code is Law and other laws of cyberspace* (1999). Lessig published a second edition of this in 2006 called *Code 2.0.*

of performance of contracts. An example of this are regulations which require there to be "kill switches" on algorithmic trading systems. These laws express the public policy that the result of interrupting the parties' private contract is more important than compelling those parties to fulfil their obligations under that contract in accordance with its terms. It is not possible to contract out of these regulations or laws; they apply regardless of its terms or its performance.

3.6 Financial Market Infrastructures

Conflict between technological outcomes and the standards of international finance is not unique. It also exists in critical financial market infrastructures, such as payment systems and clearing systems.

Payment systems and clearing systems are often required to execute the transactions submitted to them automatically, visibly, without interruption, and in many parts of the globe at once. The technological effect of these systems deviate from the standards otherwise applicable in international finance, as described above. This is required for public policy reasons linked to the systemic importance of those systems and the need for confidence in the continual functioning of the systems.

Although initially this might be thought as evidence that deviation between blockchain standards and those of commerce, regulation and law in international finance should not be a concern for blockchain use, in fact it is evidence of how much is required if that deviation is believed to be necessary. A key foundation of the transactional certainty enjoyed by users of financial market infrastructures is the legal protection which insulates those transactions from the local laws and regulations which would otherwise interfere with them. For example, local laws often protect the operation of clearing houses from the impact of the bankruptcy or insolvency of participants. Granting this protection is not a step taken lightly in any jurisdiction. Indeed, there is another set of international standards which governs its application.

The international standards applicable to determine what is important to the safety of the financial market infrastructure, are the Principles of Financial Market Infrastructures.[24] This forms a common language across jurisdictions to determine what is important and how it needs to be protected. These Principles identify legal standards as being critical to the "safety and efficiency" of the financial market infrastructure and they identify other principles which depend on legal constructs for their effectiveness. Systems

[24]Published by *CPSS-IOSCO*, April 2012.

which require protection from ordinary legal and regulatory standards need to meet these requirements. Resolving conflict between differing standards in international finance requires significant effort and collaboration.

4 Understanding Standards Deviation

The size, complexity and interconnectedness of international finance means that any new technology needs to work with the standards on which it is based. Although there are many potential uses of blockchain in international finance, blockchain standards are not able to replace those standards because they are not only based in technology, but also commerce, regulation and law. However, there are fundamental features of blockchain technology, such as immutability, distribution, visibility, authorisation and execution which are not, in their pure form, consistent with the standards of international finance. The adoption of blockchain standards in international finance will need to take these into account, so that the implementation of blockchain solutions is both efficient and effective.

This means that the solution to the adoption of blockchain standards, to manage conflict between the different standards needs the cross-disciplinary collaboration of technologists, business experts, regulations and lawyers, combining multiple disciplines of knowledge. Ultimately, driving this new collaboration may be one of the most significant benefits that blockchain technology provides to international finance.

Biography

Scott Farrell is a senior partner of King & Wood Mallesons with more than 20 years' experience in markets and systems law in Australia and Asia. Scott has given many years of service to advising on, and guiding, regulatory and legal change in the financial landscape. Much of Scott's current work is at the connection between financial markets and fintech, including

blockchain, smart contracts and data. Scott is the co-chair of the Australian Government's FinTech Advisory Group and coordinates its open banking and blockchain work streams. Scott led the Australian Government's review into Open Banking, which made the recommendations which are now being implemented to create Australia's Consumer Data Right. Scott has been named one of Asia's top 10 innovative lawyers by the Financial Times.